Beth Israel Medical Center Site - Data Integrator Notes

The Beth Israel CHP site consists of 1 Kraft Energy / Man Rich Burn Engine (KMGR-250-4SH) cogeneration unit capable of a total output of 250 kW. Thermal output from the units will be used to supply heat to the boiler return loop. A dump radiator will reject any unneeded thermal energy.

Data Point Details

An Obvius Acqusuite data logger logs data at 1-minute intervals. The data is stored in the data logger memory and manually retrieved. The data is then aggregated into hourly data and uploaded to the web site.

The timestamp in the raw data files is in Eastern Standard Time.   All data on the website is presented in Eastern Standard Time.

DG/CHP Generator Output (total kWh)
The Generator Output (a net value) is calculated from the columns labeled "Generator #1 Energy Output (Gross) (kWh)" and "Parasitic Load Energy Consumption (kWh)" in the data files from Obvius. This 1-minute interval energy data is summed into hourly data.

DG/CHP Generator Output Demand (peak kW)
The Generator Output Demand is calculated from the columns labeled "Generator #1 Power Output (Gross) (kW)" and "Parasitic Load Power Consumption (kW)" in the data files from Obvius. The net generator output is then multiplied by the data interval to determine the demand. The maximum for each hourly period is used as the demand for the generator.

DG/CHP Generator Gas Input (cubic feet)
The data for Generator Gas Input comes from the column labeled "Combined Generator Fuel Input (CCF)" in the data files from Obvius. This data is converted into standard cubic feet (e.g. divided by 100) for each 1-minute interval and summed into hourly data.

Total Facility Purchased Energy (total kWh)
No data

Total Facility Purchased Demand (peak kW)
No data

Other Facility Gas Use (cubic feet)
No data

Unused Heat Recovery (total MBtu/h)
Unused Heat Recovery comes from the columns labeled "Primary Glycol Loop Return Temperature Dowstream of Dump Radiator (deg F)", "Secondary Glycol Loop Return Temperature (From Building) (deg F)", "Primary Glycol Loop Supply Temperature (deg F)", "Secondary Glycol Loop Supply Temperature (To Building) (deg F)", "Primary Glycol Loop

Flow Rate (GPM)", and "Secondary Glycol Loop Flow (Building Loop) (GPM)" in the data files from Obvius. These points are used to calculate the heat recovery for each interval. The 1-minute interval data is summed into hourly data.

Useful Heat Recovery (total MBtu/h)
The Useful heat Recovery is obtained from the columns of data labeled "Secondary Glycol Loop Return Temperature (From Building) (deg F)", "Secondary Glycol Loop Supply Temperature (To Building) (deg F)", and "Secondary Glycol Loop Flow (Building Loop) (GPM)" in the files obtained from Obvius. These points are used to calculate the heat recovery for each interval. This 1-minute data is summed into hourly data.

Status/Runtime of DG/CHP Generator (hrs)
No data

Ambient Temperature (avg °F)
No data

Electrical Efficiency (%)
The Electrical Efficiency is calculated by dividing Generator Output (WG) in BTU's by Generator Gas Input (FGE) in BTU's. The lower heating value of natural gas used is 930 btu/cf. The expected efficiency should range from 25%-35%.

Total CHP Efficiency (%)
The Total CHP Efficiency is calculated by dividing the Generator Output and Useful Heat Recovery by the Generator Gas Input. The lower heating value of natural gas used is 930 btu/cf and the expected efficiency should range 75-90%

Data Quality Checks

The Data Quality Checks consist of three levels of verification:
- the data exist (flag=1),
- the data pass range checks (flag=2)
- the data pass relational checks (flag=3).

The methodology for applying the data quality begins by creating a contiguous database. We initially assume all data are good (flag=3) and then work backwards to identify data that does not meet Relational and/or Range Checking.

The next step is to apply the relational checks.   Relational checks attempt to identify data values which conflict with other data in the data set. For instance, data received indicating a DG/CHP Generator output when the gas use is zero is suspect. For data failing a relational check, the data quality level is set to 2 for "Data Passes Range Checks".

The last step is evaluating the range checks. The range checks consist of reasonable high and low values based on facility and DG/CHP Generator information. Data that falls outside the defined range for the database value has its data quality level set to 1 for "Data Exists."

It is necessary to work backwards when applying data quality checks to insure that data gets set to the lowest applicable data quality level. It is possible for data to pass the relational check and fail the range check and such data will be set to a data quality level of 1 for "Data Exists."

Table 1. Data Quality Definitions

Data Quality Levels	Description	Definition
3	Passes Relational Checking	This data passes Range Checks and Relational Checks. This is the highest quality data in the data set.
2	Passes Range Checks	This data passes the Range Checks but is uncorroborated by Relational Checks with other values.
1	Data Exists	This data does not pass Range Checks. This data is found to be suspect based on the facility and/or CHP equipment sizing.
0	Data Does Not Exist	This data is a placeholder for maintaining a contiguous database only.

Details on the Range and Relational Checks are found below.

Relational Checks

These checks are applied to the interval data before it is converted to hourly data. If any of the interval data points fails the relational check, the data for the entire hour is marked as failed.

Table 2. Relational Checks

Evaluated Point	Criteria	Result
FG	wg > 1 and fg=0	dflag_fg = 2

Range Checks

These checks are applied to the 1-minute data before it is converted to hourly data. If any of the 1-minute data points fails the range check, the data for the entire hour is marked as failed.

Table 3. Range Checks

Data Point	Hourly Data Method	Upper Range Check	Lower Range Check
DG/CHP Generator Output	Sum	5 kWh	0 kWh
DG/CHP Generator Output Demand	Maximum	300 kW	0 kW
DG/CHP Generator Gas Use	Sum	90 cf	0 cf
Total Facility Purchased Energy	Sum	100 kWh	0 kWh
Total Facility Purchased Demand	Maximum	100 kW	0 kW
Other Facility Gas Use	Sum	100 cf	0 cf
Unused Heat Recovery	Sum	15 Mbtu	0 MBtu
Useful Heat Recovery	Sum	15 MBtu	0 MBtu
Ambient Temperature	Average	130°F	-30°F

Notes: Data failing the Range Check has the data quality level set to 1 for "Data Exists"

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Site Notes:

8/23/2012:
The data has been posted on the website.